

## WHAT IS CLAIMED IS:

1. A process for preparing a paper web, comprising the steps of:  
providing a pulp slurry, said slurry containing at least about 30% by dry pulp weight of a low-grade pulp, said low-grade pulp being a pulp selected from the group consisting of groundwood pulp, recycled pulp, and mixtures thereof;  
adding a pre-flocculated filler to said slurry;  
forming a paper web from said slurry; and  
winding said web on a reel;  
said pre-flocculated filler being added to said slurry in an amount effective to provide a filler content in said web, at least a portion of said filler in said web comprising said pre-flocculated filler.
2. A process according to claim 1, wherein said low-grade pulp is present in said slurry in an amount of at least about 40%.
3. A process according to claim 1, wherein said low-grade pulp is present in said slurry in an amount of at least about 50%.
4. A process according to claim 1, wherein said pre-flocculated filler is selected from the group consisting of clays, lithopone, sulfate fillers, titanium pigments, talc, calcium carbonate, and gypsum.
5. A process according to claim 4, wherein said pre-flocculated filler is flocculated with a flocculating agent selected from the group consisting of cationic starch derivatives and anionic starch derivatives.
6. A process according to claim 5, wherein said pre-flocculated filler is flocculated with a cationic starch paste.
7. A process according to claim 4, wherein said pre-flocculated filler is prepared by the steps of:

continuously introducing an aqueous slurry of a non-flocculated paper filler material and an aqueous slurry of from 0.5 to 60% by weight of the filler material of a flocculating agent into a shear imparting device and imparting to the mixture within said device a shearing force sufficient to provided flocculated filler particles of a size adapted for use in paper making without any additional treatment and continuously removing said flocculated filler particles from the shear imparting device.

8. A process according to claim 1, wherein said pulp includes groundwood pulp.

9. A process according to claim 1, further comprising the steps of:  
drying said web; and  
cutting said web into sheets.

10. A process according to claim 1, wherein said pre-flocculated filler is added to said slurry in an amount effective to provide a total filler content in said web of at least about 5% by weight.

11. A process according to claim 1, wherein said pre-flocculated filler is added to said slurry in an amount effective to provide a total filler content in said web of at least about 7.5% by weight.

12. A process according to claim 1, wherein all of the filler incorporated into said web is present as a result of said addition of said pre-flocculated filler to said slurry.

13. A process according to claim 1, wherein the amount of flocculating agent in said filler ranges from about 0.5% to about 4% dry flocculant by dry weight of said filler.

14. A paper web prepared by the process of claim 1.

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15. A paper web prepared in accordance with claim 9.

16. A paper web prepared in accordance with claim 15 wherein said process includes the step of printing on said web prior to cutting said web into sheets.

17. A process for preparing a newspaper, the process comprising the steps of:

providing a newsprint pulp;

adding a pre-flocculated filler to said slurry;

forming a paper web from said slurry, said pre-flocculated filler being added to said slurry in an amount effective to provide a filler content in said web, at least a portion of said filler in said web comprising said pre-flocculated filler;

collecting said web on a reel;

after collecting said web on a reel, in either order:

printing on said web; and

cutting said web into sheets.

18. A process according to claim 17, wherein said web is cut into sheets after said step of printing on said web.

19. A process for preparing a paper web, comprising the steps of:

providing a pulp slurry, said slurry containing at least about 30% dry pulp weight of a low-grade pulp, said low-grade pulp being a pulp selected from the group consisting of groundwood pulp, recycled pulp, and mixtures thereof;

adding a pre-flocculated filler to said slurry to thereby form a slurry/filler mixture;

introducing said slurry/filler mixture to the headbox of a paper-making machine;

depositing said slurry on a web-former; and  
withdrawing a paper web from said headbox;

said pre-flocculated filler being added to said slurry in an amount effective to provide a filler content in said web, at least a portion of said filler in said web comprising said pre-flocculated filler.

20. A process according to claim 19, wherein said low-grade pulp is present in said slurry in an amount of at least about 40%.

21. A process according to claim 19, wherein said low-grade pulp is present in said slurry in amount of at least about 50%.

22. A process according to claim 19, wherein said pre-flocculated filler is selected from the group consisting of clays, lithopone, sulfate fillers, titanium pigments, talc, calcium carbonate, and gypsum.

23. A process according to claim 22, wherein said pre-flocculated filler is flocculated with a flocculating agent selected from the group consisting of cationic starch derivatives and anionic starch derivatives.

24. A process according to claim 23, wherein said pre-flocculated filler is flocculated with a cationic starch paste.

25. A process according to claim 22, wherein said pre-flocculated filler is prepared by the steps of:

continuously introducing an aqueous slurry of a non-flocculated paper filler material and an aqueous slurry of from 0.5 to 60% by weight of the filler material of a flocculating agent into a shear imparting device and imparting to the mixture within said device a shearing force sufficient to provide flocculated filler particles of a size adapted for use in paper making

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without any additional treatment and continuously removing said flocculated filler particles from the shear imparting device.

26. A process according to claim 19, wherein said pulp includes groundwood pulp.

27. A process according to claim 19, further comprising the steps of:  
drying said web; and  
cutting said web into sheets.

28. A process according to claim 19, wherein said pre-flocculated filler is added to said slurry in an amount effective to provide a total filler content in said web of at least about 5% by weight.

29. A process according to claim 19, wherein said pre-flocculated filler is added to said slurry in an amount effective to provide a total filler content in said web of at least about 7.5% by weight.

30. A process according to claim 19, wherein all of the filler incorporated into said web is present as a result of said addition of said pre-flocculated filler into said slurry.

31. A process according to claim 19, wherein the amount of flocculating agent in said filler ranges from about 0.5% to about 4% dry flocculant by dry weight of said filler.

32. A paper web prepared by the process of claim 19.

33. A paper web prepared in accordance with claim 27.

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34. A paper web prepared in accordance with claim 33, wherein said process includes the step of printing on said web prior to cutting said web into sheets.

35. A process for treating a fibrous slurry of coated broke, comprising the steps of:

providing a repulped slurry of coated broke, said slurry containing fibers and particles of coating residue;

adding a chemical flocculant to said slurry in an amount effective to form flocs of said fibers and said particles of coating residue; and

applying a shearing force to said slurry, said shearing force being sufficient to limit the size of said flocs to a size that is effective to enhance the retention of said flocs in a paper web.

36. A process according to claim 35, wherein said flocs have an average particle size after shearing in the range of 30 to 75 microns.

37. A process according to claim 35, wherein said flocculant is selected from the group consisting of water soluble vinyl polymers, gums, polyacryamide, polyDADMAC, aluminum sulfate, mannogalactanes, and charged starch derivatives.

38. A process according to claim 35, wherein said chemical flocculant is added in an amount ranging from about 0.05% to about 60% by weight of broke material in said slurry.

39. A process according to claim 35, wherein said chemical flocculant is added in an amount ranging from about 5% to about 15% by weight of broke material in said slurry.

40. A process for preparing a paper web, comprising the steps of:  
providing a treated slurry of coated broke, said treated slurry having been prepared by a process comprising the steps of:

providing a repulped slurry of coated broke, said slurry containing fibers and particles of coating residue;

adding a chemical flocculant to said slurry in an amount effective to form flocs of said fibers and particles of coating residue;  
and

applying a shearing force to said slurry, said shearing force being sufficient to limit the size of said flocs to a size that is effective to enhance the retention of said flocs in a paper web; and  
withdrawing a paper web from said treated slurry.

41. The paper web prepared by the process of claim 40.

42. A process for preparing a paper web, comprising the steps of:  
providing a treated slurry of coated broke, said treated slurry having been prepared by a process comprising the steps of:

providing a repulped slurry of coated broke, said slurry containing fibers and particles of coating residue;

adding a chemical flocculant to said slurry in an amount effective to form flocs of said fibers and particles of coating residue;  
and

applying a shearing force to said slurry, said shearing force being sufficient to limit the size of said flocs to a size that is effective to enhance the retention of said flocs in a paper web;  
adding said treated slurry to a fibrous pulp slurry to form a combined slurry; and  
withdrawing a paper web from said combined slurry.

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43. A process according to claim 42, wherein said shearing force ranges from about 2800 to about 9200 s<sup>-1</sup>.

44. A process according to claim 42, wherein said flocculant is selected from the group consisting of water soluble vinyl polymers, gums, polyacryamide, polyDADMAC, aluminum sulfate, mannogalactanes, and charged starch derivatives.

45. A process according to claim 42, wherein said chemical flocculant is added in an amount ranging from about 0.05% to about 60% by weight of broke material in said slurry.

46. A process according to claim 42, wherein said chemical flocculant is added in an amount ranging from about 5% to about 15% by weight of broke material in said slurry.

47. A process according to claim 42, wherein said treated slurry is added in an amount ranging from 5% to 25% of said fibrous pulp slurry.

48. The paper web prepared by the process of claim 42.

49. A continuous process for treating a fibrous slurry of coated broke, comprising the steps of:

continuously introducing a repulped slurry of coated broke and a chemical flocculant into a shear imparting device, said slurry containing fibers and particles of coating residue and said chemical flocculant being added in an amount effective to form flocs of said fibers and said particles of coating residue; and

continuously withdrawing from said shear imparting device a slurry containing said flocs, the shearing force imparted by said device being sufficient to limit the size of said flocs to a size that is effective to enhance the retention of said flocs in a paper web.



50. A process according to claim 49, wherein said shearing force ranges from about 2800 to about 9200 s<sup>-1</sup>.

51. A process according to claim 49, wherein said flocculant is selected from the group consisting of water soluble vinyl polymers, gums, polyacrylamide, polyDADMAC, aluminum sulfate, mannogalactanes, and charged starch derivatives.

52. A process according to claim 49, wherein said chemical flocculant is added in an amount ranging from about 0.05% to about 60% by weight of broke material in said slurry.

53. A process according to claim 49, wherein said chemical flocculant is added in an amount ranging from about 5% to about 15% by weight of broke material in said slurry.

54. A process for preparing a paper web, comprising the steps of:  
providing a treated slurry of coated broke, said treated slurry having been prepared by a process comprising the steps of:

continuously introducing a repulped slurry of coated broke and a chemical flocculant into a shear imparting device, said slurry containing fibers and particles of coating residue and said chemical flocculant being added in an amount effective to form flocs of said fibers and said particles of coating residue;

continuously withdrawing from said shear imparting device a slurry containing said flocs, the shearing force imparted by said device being sufficient to limit to size of said flocs to a size that is effective to enhance the retention of said flocs in a paper web; and

withdrawing a paper web from said slurry.

55. The paper web prepared by the process of claim 54.

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56. A process for preparing a paper web, comprising the steps of:  
providing a treated slurry, said treated slurry having been prepared by  
a process comprising the steps of:

continuously introducing a repulped slurry of coated broke and  
a chemical flocculant into a shear imparting device, said slurry  
containing fibers and particles of coating residue and said chemical  
flocculant being added in an amount effective to form flocs of said  
fibers and said particles of coating residue;

continuously withdrawing from said shear imparting device a  
slurry containing said flocs, the shearing force imparted by said  
device being sufficient to limit to size of said flocs to a size that is  
effective to enhance the retention of said flocs in a paper web;

adding said treated slurry to a fibrous pulp slurry to form a  
combined slurry; and

withdrawing a paper web from said combined slurry.

57. A process according to claim 56, wherein said shearing force ranges  
from about 2800 to about 9200  $s^{-1}$ .

58. A process according to claim 56, wherein said flocculant is selected  
from the group consisting of water soluble vinyl polymers, gums, polyacryamide,  
polyDADMAC, aluminum sulfate, mannogalactanes, and charged starch derivatives.

59. A process according to claim 56, wherein said chemical flocculant is  
added in an amount ranging from about 0.05% to about 60% by weight of broke  
material in said slurry.

60. A process according to claim 56, wherein said chemical flocculant is  
added in an amount ranging from about 5% to about 15% by weight of broke  
material in said slurry.

61. A process according to claim 56, wherein said treated slurry is added in an amount ranging from 5% to 25% of said fibrous pulp slurry.

62. The paper web prepared by the process of claim 56.

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